

Name: Solutions

Natural Logarithm:  $\log_e x = \ln x$

The log base e of x is written in abbreviated form as  $\ln x$  without the subscripted e.

Common Logarithm:  $\log_{10} x = \log x$

The log base 10 of x is written in abbreviated form as  $\log x$  without the subscripted 10.

Evaluate each logarithmic expression (using a calculator only when you see a \*).

1. $\log_e (e^2) = 2$	2. $\ln e^2 = 2$
3. $\log_e 12 = * 2.4849$	4. $\ln 12 = * 2.4849$
5. $\log_{10} 10,000 = 4$	6. $\log 10,000 = 4$
7. Given $\log_{10} 2 = 0.3010$ , $\log_{10} 200 =$ $\log(2 \cdot 100) = \log 2 + \log 100$ $= 0.3010 + 2 = 2.3010$	8. Given $\log 2 = 0.3010$ , $\log 200 =$ $\log 200 = \log(2 \cdot 100) = \log 2 + \log 100$ $= 0.3010 + 2 = 2.3010$
9. $\ln 100 = * 4.6052$	10. $\log 100 = 2$
11. $\log_e 20 = * 2.996$	12. $\log 20 = * 1.3010$
13. True or False:  Given $\ln 3 = 0.0986$ , $\ln(3e^4) = \ln 3 + \ln e^4 \approx 0.0986 + 4 = 4.0986$ <u>True</u>	14. True or False: *  $\log(3e^4) = \log 3 + \log e^4$ $\approx 0.4771 + 1.7372 = 2.2143$ <u>True</u>

15. $\ln 5 = *$ 1.6094	16. $\log 5 = *$ 0.6990
17. $\ln 6 = *$ 1.7918	18. $\log 6 = *$ 0.7782
19. $\ln 7 = *$ 1.9459	20. $\log 7 = *$ 0.8451
21. $\ln 8 = *$ 2.0794	22. $\log 8 = *$ 0.9031
23. $\ln 9 = *$ 2.1972	24. $\log 9 = *$ 0.9542
25. $\ln 10 =$ 2.3026	26. $\log 10 =$ 1
27. $\ln 0 =$ undefined	28. $\log 0 =$ undefined
29. $\ln\left(\frac{1}{e}\right) = -1$	30. $\log\left(\frac{1}{e}\right) = *$ -0.4343
31. $\ln(-e) = *$ undefined	32. $\log(-e) = *$ undefined